product of said delta-12 fatty acid desaturase gene non-functional.

70. The method of claim 69, wherein said identifying step comprises a technique selected from the group consisting of: PCR, 3SR and direct polynucleotide sequencing.

REMARKS

Claims 1-3, 5-10, 27-29, 31-35, 37-46 and 55-66 are pending and stand rejected.

Applicants thank the Examiner for the courtesy of the personal interview on September 22, 1998, to clarify issues remaining in the case. In view of the issues discussed at the interview, Applicants respectfully request entry of the amendments to claims 1, 6-7, 10, 27, 31-33, 35, 37, 40-41, 44-46, 55, 57, 64 and 66 presented above, as well as entry of proposed new claims 67-70. The claim amendments presented above raise no new issues that would require further consideration and/or search and place the case in better condition for allowance or appeal.

Proposed amendments to claims 1, 27, 35, 44, 46, 55, 57, 64 and 66 more particularly point out and distinctly indicate that mutations of the invention render the products of the mutant delta-12 and delta-15 desaturase genes non-functional. Support for these amendments can be found, for example, at page 18, lines 1-12.

Amendments to claims 6, 31-32, 37, 40 and 45 are proposed for grammatical clarity, proper dependency and proper antecedent basis.

Amendments to claims 7, 10, 33 and 41 are proposed to more particularly point out the codon in which the mutation of the claims occurs. Support for these amendments is found, for example, at page 14, lines 16-29, and at page 15, lines 12-17.

Proposed new claims 67-70 describe methods for identifying mutations in *Brassicaceae* or *Helianthus* plants that have a decreased α-linolenic acid or an increased oleic acid

content. The methods involve identifying mutations in His-Xaa-Xaa-Xaa-His amino acid motifs of delta-12 or delta-15 desaturase genes that render the desaturases non-functional. Support for these claims is found throughout the specification, including Example 12, pages 60-62.

No new matter is added by the proposed claim amendments or proposed claims.

Withdrawal of Claims 10 and 66 As Drawn to Non-elected Invention

The Examiner indicated that claims 10 and 66 were withdrawn from consideration as being directed to a non-elected invention. The Examiner stated that amended claims 10 and 66 recited a Tyr-Leu-Asn-Asn-Pro motif and a mutation of this motif, which was not represented by original claim 10 (Lys-Tyr-His-Asn-Asn-Pro).

Applicants respectfully traverse. The Tyr-Leu-Asn-Asn-Pro motif was recited in original claim 46 and remains in pending claim 46. Thus, the motif recited in independent claim 66 is not drawn to a non-elected invention. Applicants respectfully request that claims 10 and 66, as amended, be considered with the other pending claims.

Rejection Under 35 U.S.C. §112, Second Paragraph

The Examiner rejected claims 31-33 under 35 U.S.C. §112, second paragraph, as these claims depend from canceled claim 30. Claims 31-33 have been amended to depend from pending independent claim 27. The Examiner is respectfully requested to withdraw the rejection of claims 31-33 under 35 U.S.C. §112, second paragraph.

The Examiner rejected claims 1-3, 5-9, 27-29, 31-32, 34-35, 37-46 and 55-65 under 35 U.S.C. §112, second paragraph. The Examiner asserted that "a mutation that affects an aa sequence need not affect the aa function, such as conservative substitutions or point mutations, and while mutations which affect oleic acid levels could be due to modification in the

steady state activity of the enzyme encoded, such as down or up regulation, the specification clearly teaches the limitation of mutations to include only those which make the enzyme non-functional".

Applicants have amended independent claims 1, 27, 35, 44, 55, 57 and 64 to recite that the claimed mutations render the resulting gene product non-functional. The Examiner is respectfully requested to withdraw the rejection of claims 1-3, 5-9, 27-29, 31-32, 34-35, 37-46 and 55-65 under 35 U.S.C. §112, second paragraph.

The Examiner rejected claims 1-3, 5-10, 27-29, 31-34 and 66 under 35 U.S.C. §112, second paragraph. The Examiner asserted that the limitation of "at least about 20 nucleotides" and "in a region of said desaturase gene encoding a His-Xaa-Xaa-Xaa-His amino acid motif" in claim 1 and related claims were not linked, and that 20 nucleotide fragments need not comprise the motif. Applicants respectfully traverse.

The last line of independent claims 1, 27 and 66 specifies that the 20 nucleotide sequence of the claimed nucleic acid fragment "includes said at least one mutation." Thus, each claim recites that the nucleic acid fragments of the invention comprise a sequence of at least about 20 nucleotides, have at least one mutation in a region of the desaturase gene encoding the specified amino acid motif and that the fragment includes the mutation. Thus, Applicants submit that there is linkage between the indicated elements of the claims. The Examiner is respectfully requested to withdraw the rejections of claims 1-3, 5-10, 27-29, 31-34 and 66 under 35 U.S.C. §112, second paragraph.

Rejections Under 35 U.S.C. §102(b)

The Examiner rejected claims 1-5 and 8-9 as being anticipated by Lightner et al. and claims 27-31, 34-35, 38-39 and 42-43 as being anticipated by Browse et al. under 35 U.S.C. §102(b) for reasons of record.

Applicants have amended independent claims 1 and 27 to recite that the claimed mutations render the resulting gene product non-functional. Lightner et al. and Browse et al. do not disclose mutations in His-Xaa-Xaa-Xaa-His amino acid motifs, let alone mutations that render the desaturase gene product non-functional. Thus, the cited references do not anticipate the claimed invention.

The Examiner is respectfully requested to withdraw the rejection of claims 1-5, 8-9, 27-31, 34-35, 38-39 and 42-43 under 35 U.S.C. §102(b).

Rejections Under 35 U.S.C. §103

The Examiner rejected claims 1-5, 8-9, 27-29, 31, 34-39, 42-45 and 55-65 under 35 U.S.C. §103 as being unpatentable over Lightner et al. and Browse et al. in view of Pleines et al. for reasons of record. Applicants respectfully traverse.

Lightner et al. and Browse et al. do not disclose mutations in His-Xaa-Xaa-Xaa-His amino acid motifs, nor mutations that render the desaturase gene product non-functional.

Pleines et al. describe attempts to select plant lines with reduced C18:3 levels by breeding, and suggest that rapeseed oil for food consumption could be improved by mutagenic treatments and interspecific crosses. However, Pleines et al. do not teach or suggest which regions of desaturase genes should be mutagenized nor describe any mutations in His-Xaa-Xaa-Xaa-His motifs that render the desaturase gene products non-functional. Instead, Pleines et al. merely use conventional plant breeding in an attempt to alter fatty acid composition in *Brassica* plants.

The combination of cited art does not teach which regions of the desaturase gene sequences should be targeted. Furthermore, the cited art does not teach that the mutations of the present invention render the gene product non-functional. Thus, the combination of cited art does not teach or suggest the claimed invention.

The Examiner is respectfully requested to withdraw the rejections of claims 1-5, 8-9, 27-29, 31, 34-39, 42-45 and 55-65 under 35 U.S.C. §103 over Lightner et al. and Browse et al. in view of Pleines et al.

Applicants submit that all claims are in condition for allowance upon entry of the amendments above, which action is requested. The Examiner is invited to telephone the undersigned agent if it is felt that such would advance prosecution.

Please charge any additional fees, or make any credits, to Deposit Account No. 06-1050.

Respectfully submitted,

Date: Sep 25, 1998

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